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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
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| 10/816,728 | 04/02/2004 | Harry Rieger | 67411811.001106 | 1021 |

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EXAMINER

DINH, TRINH VO

| | |
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| ART UNIT | PAPER NUMBER |
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2821

| SHORTENED STATUTORY PERIOD OF RESPONSE | MAIL DATE | DELIVERY MODE |
|--|------------|---------------|
| 3 MONTHS | 02/02/2007 | PAPER |

Please find below and/or attached an Office communication concerning this application or proceeding.

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

Office Action Summary

Application No.

10/816,728

Applicant(s)

RIEGER, HARRY

Examiner

Trinh Vo Dinh

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on an RCE filed 10/23/2006.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-17 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-17 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

This is a response to the RCE filed 10/23/2006. Claims 1-17 are pending in the application.

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless -

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

2. Claims 1, 3 and 17 are rejected under 35 U.S.C. 102(b) as being anticipated by Muncheryan (U.S. 4,808,789).

With respect to claims 1 and 3, Muncheryan teaches a laser rod (5) and at least one diode array (6) located proximate to the laser rod, each diode array having a plurality of high-power diode bars spaced thereon wherein the spacing between the high-power diode bars and the location of the diode array from the laser rod are selected such that the full-width, half-max (FWHM) point of the radiation from one diode bar overlaps the FWHM point of the radiation of an adjacent diode bar so that the radiation received by the laser rod (5) fluctuates less than about 30% along the entire length of the laser rod (col. 2, lines 37-50). Muncheryan further discloses each diode array (6) including five high-power diode bars (5 in Fig. 1).

With respect to claim 17, the apparatus discussed above would perform the claimed method.

3. Claims 1, 3 and 17 are rejected under 35 U.S.C. 102(b) as being anticipated by Muncheryan (U.S. 4,979,180).

With respect to claims 1 and 3, Muncheryan teaches a laser rod (9 in Fig. 1, or 93, 94 in Figs. 7-8) and at least one diode array (9A in Fig. 1, or 91, 92 in Figs. 7-8) located proximate to the laser rod, each diode array having a plurality of high- power diode bars spaced thereon wherein the spacing between the high-power diode bars and the location of the diode array from the laser rod are selected such that the full-width, half-max (FWHM) point of the radiation from one diode bar overlaps the FWHM point of the radiation of an adjacent diode bar so that the radiation received by the laser rod fluctuates less than about 30% along the entire length of the laser rod (col. 2, lines 38-52). Muncheryan further discloses each diode array including five high-power diode bars (11 diodes in each array of 91 or 92 in Fig. 8).

With respect to claim 17, the apparatus discussed above would perform the claimed method.

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

5. Claims 1-17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Rieger et al (U.S. 2002/0018288 of record) in view of Muncheryan (U.S. 4,808,789 or U.S. 4,979,180).

With respect to claim 1, Rieger teaches a laser rod (160; figure 8); and at least one diode array (18; figure 8) located proximate to the laser rod, each diode array having a plurality of high-power diode bars spaced thereon. Claim 1 requires the spacing between the high-power diode bars and the location of the diode array from the laser rod are selected such that the full-width, half-max (FWHM) point of the radiation from one diode bar overlaps the FWHM point of

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the radiation of an adjacent diode bar so that the radiation received by the laser rod fluctuates less than about 30% along the entire length of the laser rod. Such a configuration is found in Muncheryan (col. 2, lines 37-52) At the time of the invention, it would have been obvious to one having ordinary skill in the art to take the system of Rieger and further state overlapping of the FWHM point of adjacent diode bars. The motivation for doing so would have been to provide the laser system with a most efficient performance (Muncheryan: col. 2 lines 50-52).

With respect to claims 2 and 10, Rieger teaches each of the high-power diode bars producing at least about 50W (paragraph 0070).

With respect to claims 3 and 11, Rieger teaches each diode array includes five high-power diode bars (figure 8).

Claims 4 and 12 require the plurality of high-power diode bars have a spacing of about 12.5 mm in the diode array. It is well known in the art that one should space the diode arrays appropriately in order to optimize pumping uniformity and efficiency. Therefore, at the time of the invention, it would have been obvious to one having ordinary skill in the art to take the system of Rieger and state a diode bar spacing of about 12.5 mm. The motivation for doing so would have been to uniformly pump the laser rod in order to minimize hot spots and reduce thermal stress, non-uniform gain and other undesirable thermal optical effects, as is suggested by Rieger (paragraph 0128).

Claims 5 and 13 require the distance from each diode array to the center of the laser rod be about 25 mm. It is well known in the art that one should distance the diode array from the center of the laser rod at a specific desired position due to the weakening of pump radiation over larger distances. Therefore, at the time of the invention, it would have been obvious to one

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having ordinary skill in the art to take the system of Rieger and state a distance from the diode arrays to the center of the laser rod be about 25mm. The motivation for doing so would have been to pump the laser rod with a specific pumping power, as is suggested by Rieger (paragraph 0128).

With respect to claim 6, Rieger teaches five diode arrays being placed around the circumference of the laser rod with an angular separation of about 72 degrees (figures 8-10).

With respecting claims 7 and 15, Rieger teaches a transparent coolant barrier (170 and 190) surrounding the laser rod, wherein the coolant barrier is operable to pass a coolant.

With respect to claims 8 and 16, Rieger teaches the coolant comprising water (paragraph 0106).

With respect to claim 9, Rieger teaches a first laser rod having a longitudinal axis; an odd number of first diode arrays located proximate to the first laser rod, each first diode array having a plurality of high-power diode bars spaced thereon, wherein the first diode arrays are positioned around the circumference of the laser rod with an even angular separation; a second laser rod having a longitudinal axis that is aligned with the longitudinal of the first laser rod; an odd number of second diode arrays located proximate to the second laser rod, each second diode array having a plurality of high-power diode bars spaced thereon, wherein the second diode arrays are positioned around the circumference of the laser rod with an even angular separation that is inversely proportional to the angular separation of the first diode arrays; a 90 degree rotator disposed between the first and second laser rods along the longitudinal axes of the laser rods; and a compensating lens disposed between the first and second laser rods along the longitudinal axes of the laser rods, wherein the compensating lens imparts a negative spherical

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lensing effect (figures 2 and 8-10; page 18). Claim 9 requires that the spacing between the high-power diode bars and the location of the diode array from the laser rod are selected such that the full-width, half-max (FWHM) point of the radiation from one diode bar overlaps the FWHM point of the radiation of an adjacent diode bar so that the radiation received by the laser rod fluctuates less than about 30% along the entire length of the laser rod. Such a configuration is found in Muncheryan (col. 2, lines 37-52). At the time of the invention, it would have been obvious to one having ordinary skill in the art to take the system of Rieger and further state overlapping of the FWHM point of adjacent diode bars. The motivation for doing so would have been to provide the laser system with a most efficient performance (Muncheryan: col. 2 lines 50-52).

With respect to claim 14, Rieger teaches five diode arrays being placed around the circumference of the first laser rod with an angular separation of about 72 degrees and five diode arrays being placed around the circumference of the second laser rod with an angular separation of about 72 degrees (figures 8-10).

With respect to claim 17, the apparatus discussed in claim 1 would perform the claimed method.

6. Claim 2 is rejected under 35 U.S.C. 103(a) as being unpatentable over Muncheryan in view of Spinelli (U.S. 6,590,911 of record).

Claim 2 requires each of the high-power diode bars produce at least about 50W. Such power requirements are well known in the art, as is evidenced by Spinelli (column 1, lines 45-55). Therefore, at the time of the invention, it would have been obvious to one having ordinary

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skill in the art to utilize the high-power diode bars of Spinelli in the system of Muncheryan.

Doing so would have been to efficiently pump the laser rod.

7. Claims 4-6 are rejected under 35 U.S.C. 103(a) as being unpatentable over Muncheryan in view of Du (U.S. 6,351,477 of record).

Claim 4 requires the plurality of high-power diode bars have a spacing of about 12.5 mm in the diode array. It is well known in the art that one should space the diode arrays appropriately in order to optimize pumping uniformity and efficiency. Therefore, at the time of the invention, it would have been obvious to one having ordinary skill in the art to take the system of Muncheryan and state a diode bar spacing of about 12.5 mm. The motivation for doing so would have been to uniformly pump the laser rod in order to minimize hot spots and reduce thermal stress, non-uniform gain and other undesirable thermal optical effects.

Claim 5 requires the distance from each diode array to the center of the laser rod be about 25 mm. It is well known in the art that one should distance the diode array from the center of the laser rod at a specific desired position due to the weakening of pump radiation over larger distances. Therefore, at the time of the invention, it would have been obvious to one having ordinary skill in the art to take the system of Muncheryan and state a distance from the diode arrays to the center of the laser rod be about 25 mm.

Claim 6 requires that the five diode arrays be placed around the circumference of the laser rod with an angular separation of about 72 degrees. Du teaches such a configuration (figure 20). At the time of the invention, it would have been obvious to one having ordinary skill in the art to utilize the 72 degree separation laser diode configuration of Du in the system as

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taught or suggested by Muncheryan. The motivation for doing so would have been to uniformly pump the entire surface area of the laser rod.

8. Claims 7 and 8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Muncheryan in view of Chang et al (U.S. 5,978,407 of record).

Claim 7 requires a transparent coolant barrier surrounding the laser rod, wherein the coolant barrier is operable to pass a coolant over the surface of the laser rod. Such a configuration is well known in the art, as is evidenced by Chang ("WATER JACKET" in figure 2). At the time of the invention, it would have been obvious to one having ordinary skill in the art to combine the coolant barrier of Chang with the system as taught or suggested by Muncheryan. The motivation for doing so would have been to provide means for cooling the laser rod.

With respect to claim 8, Chang teaches the coolant comprising water ("WATER JACKET" in figure 2).

Inquiry

9. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Trinh Vo Dinh whose telephone number is (571) 272-1821. The examiner can normally be reached on Monday to Friday from 9:30AM to 6:00PM. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Douglas Owens, can be reached on (571) 272-1662. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

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